



Internship in experimental nuclear physics

Reconstruction of the fission-fragment nuclear charge in the FALSTAFF spectrometer

Description

The FALSTAFF spectrometer is a detector designed for the study of fast-neutron-triggered nuclear fission. The experiment program includes the study of fission for a set of actinide nuclei of interest for power-plant nuclear reactors, in particular for the next-generation nuclear power-plants.

FALSTAFF detects both fragments of fission reactions and determines, for each of them, the velocity vector by trajectography and time of flight and the kinetic energy by calorimetry in an ionisation chamber. This technique aims at the reconstruction of the fragment mass before and after neutron evaporation as well as its kinetic energy at the reaction point. The choice of an axial ionisation chamber allows in principle to determine the nuclear charge of each fragment through the analysis of the time-dependence of the ionisation signal in the chamber.

The goal of the internship is to develop a software tool based on neural networks to determine the relationship between the registered signals (shape, height and other characteristics) and the fragment atomic number. The work will be start with the analysis of the time-dependence of the signals. First tests as well as the choice of the neural network type and architecture will be performed with experimental data. A particular attention will be paid to the influence of the fragment's apparent charge on the ionisation time signals.

This work does not lead to a PhD-thesis.

Expected skills:

Nuclear physics, particle-matter interaction, C++/python programming, neural networks

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